

Monkeypox

Surveillance and Investigation Protocol

Table of Contents

I.	ABOUT THE DISEASE.....	2
A.	Clinical Presentation.....	2
B.	Etiologic Agent.....	2
C.	Reservoir	2
D.	Incubation Period.....	3
E.	Mode of Transmission	3
F.	Period of Communicability.....	3
II.	DISEASE CONTROL AND PREVENTION.....	3
A.	Disease Prevention and Control Objectives.....	3
B.	Disease Prevention and Control	3
III.	DISEASE INVESTIGATION	4
A.	Case Detection.....	4
B.	Case Definition	4
C.	Case Classification.....	6
D.	Reporting Timeframe to Public Health.....	6
E.	Outbreak Recognition	6
F.	Healthcare Provider Responsibilities	6
G.	Laboratory Responsibilities	9
H.	Local Health Responsibilities	9
I.	State Health Responsibilities.....	9
J.	Occupational Health.....	10
IV.	DISEASE SURVEILLANCE	11
A.	Public Health Significance	11
B.	Disease Surveillance Objectives	11
C.	Surveillance Indicators	11
V.	REFERENCES	12

Division of Infectious Disease Epidemiology

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Monkeypox

Surveillance and Investigation Protocol

I. ABOUT THE DISEASE

Monkeypox is a zoonotic disease that typically presents with fever, rash, and swollen lymph nodes. It is transmitted through respiratory droplets or direct contact with infected secretions or body fluids. Monkeypox can cause severe disease.

Monkeypox is rare in the U.S. On May 17, 2022, a case of monkeypox was reported in the country. During this time, multiple clusters of monkeypox have also been reported in several countries in Europe and North America involving people who self-identify as gay, bisexual, or men who have sex with men.

A suspect case or confirmed case of monkeypox in West Virginia is a Category I disease and requires immediate reporting to the local health department for prompt action.

A. Clinical Presentation

Monkeypox begins with fever, headache, muscle aches, and exhaustion. The main difference between smallpox and monkeypox is that monkeypox causes swollen lymph nodes (lymphadenopathy) while smallpox does not. Swelling of lymph nodes may be more generalized or localized to several areas. The illness begins with:

- Fever
- Headache
- Muscle aches
- Backache
- Swollen lymph nodes
- Chills
- Exhaustion
- Weakness

Within 1 to 3 days after the appearance of initial symptoms, the patient develops a rash, often beginning on the face then spreading to other parts of the body. Lesions typically begin to develop simultaneously and evolve together on any given part of the body. Lesions progress through the following stages before falling off: Macules → Papules → Vesicles → Pustules → Scabs

The illness typically lasts for 2–4 weeks.

B. Etiologic Agent

Monkeypox is caused by infection with monkeypox virus which belongs to the *Orthopoxvirus* genus in the family *Poxviridae*. The *Orthopoxvirus* genus also includes variola virus (which causes smallpox), vaccinia virus (used in the smallpox vaccine), and cowpox virus.

C. Reservoir

The natural reservoir of monkeypox remains unknown. However, African rodents and non-human primates (monkeys) may harbor the virus and infect people.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

D. Incubation Period

Typically, 7–14 days but can range from 5–21 days. A person is not contagious during this period.

E. Mode of Transmission

The virus enters the body through broken skin, respiratory tract, or the mucous membranes (eyes, nose, or mouth). Transmission of monkeypox virus occurs when a person comes into contact with the virus from an animal, human, or materials contaminated with the virus.

- Animal-to-human transmission may occur by bite or scratch, bush meat preparation, direct contact with body fluids or lesion material, or indirect contact with lesion material, such as through contaminated bedding or clothing.
- Human-to-human transmission is thought to occur primarily through large respiratory droplets. Prolonged face-to-face contact is required.
- Other human-to-human methods of transmission include direct contact with body fluids or lesion material, and indirect contact with lesion material, such as through contaminated clothing or linens.

F. Period of Communicability

A person is contagious from onset of enanthem (first lesions to develop on tongue and in mouth) until the lesions scab. A person may sometimes be contagious during early onset of symptoms (e.g., fever, malaise, headache, lymphadenopathy, etc.).

II. DISEASE PREVENTION AND CONTROL

A. Disease Prevention and Control Objectives

Reduce disease risk through:

1. Public education regarding prevention and control measures – personal hygiene, respiratory precautions, sexual transmission, etc.
2. Public education regarding travel to areas where there is ongoing transmission of monkeypox.
3. Health care provider education on recognition and reporting of disease.
4. Detection of local transmission of monkeypox in West Virginia.

B. Disease Prevention and Control

1. Avoid contact with animals that could harbor monkeypox.
2. Avoid contact with any materials that have been in contact with a sick animal or person.
3. Isolate infected patients from others who could be at risk for infection.
4. Because of the theoretical risk of airborne transmission of monkeypox virus, airborne precautions should be applied whenever possible.
5. If a patient presenting for care at a health care facility is suspected of having monkeypox, infection control personnel should be notified immediately.
6. Practice good hand hygiene after contact with infected animals or humans, i.e., wash your hands with soap and water or use an alcohol-based hand sanitizer.

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Monkeypox

Surveillance and Investigation Protocol

7. Use appropriate personal protective equipment (PPE) when caring for patients. Required PPE includes gown, respirator, face shield, and gloves. For more information, see [Monkeypox Prevention](#).

C. Prophylaxis and Treatment

1. JYNNEOS™ (also known as Imvamune or Imvanex) is the only vaccine with an FDA-approved indication for monkeypox in adults 18 years and older. It can be used for pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) in adults as a two-dose series, four weeks apart.
2. The ACAM2000 vaccine is an FDA-approved vaccine for smallpox and its PEP use for other orthopoxvirus infection is considered an unapproved use by FDA. Therefore, the Centers for Disease Control and Prevention (CDC) holds an expanded access investigational new drug (IND) protocol to facilitate access to and use of ACAM2000 for PEP of monkeypox during an isolated incident or outbreak.
3. Tecovirimat, an antiviral drug approved for treatment of smallpox, is available as an oral capsule formulation or an intravenous vial. Oral capsules are shipped and stored at controlled room temperature; intravenous vials are shipped and stored refrigerated. Its use for other orthopoxvirus infection is covered by a CDC-held expanded access IND protocol.
4. State health departments may request medical counter measures through the Strategic National Stockpile on behalf of those needing pre- or post-exposure or treatment for monkeypox.

III. DISEASE INVESTIGATION

A. Case Detection

Monkeypox lesions may be disseminated or located on the genital or perianal area alone. Some patients may present with proctitis and their illness could be clinically confused with a sexually transmitted infection (STI) like syphilis or herpes, or with varicella zoster virus infection. Although some populations may have a greater chance of exposure right now, monkeypox infections are not exclusive to the gay and bisexual communities in the U.S.

B. Case Definition (2022) †

Source: <https://www.cdc.gov/poxvirus/monkeypox/clinicians/case-definition.html>

The rash associated with monkeypox involves vesicles or pustules that are deep-seated, firm, and well-circumscribed. The lesions may umbilicate or become confluent and progress over time to scabs. Presenting symptoms include fever, chills, the distinctive rash, or new lymphadenopathy. Perianal or genital lesions in the absence of subjective fever have been reported. The rash associated with monkeypox can be confused with other diseases that are more commonly encountered in clinical practice (e.g., secondary syphilis, herpes, chancroid, and varicella zoster).

Clinical Criteria

1. New rash (any of the following)
 - Macular
 - Papular

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Monkeypox

Surveillance and Investigation Protocol

- Vesicular
- Pustular
- 2. Fever (either of the following)
 - Subjective
 - Measured temperature of $\geq 100.4^{\circ}\text{F}$ [$>38^{\circ}\text{C}$]
- 3. Other signs and symptoms:
 - Chills and/or sweats
 - New lymphadenopathy (periauricular, axillary, cervical, or inguinal)
- Generalized or localized
- Discrete or confluent

Epidemiologic Criteria

Within 21 days of illness onset:

- Report having had contact with a person or people with a similar appearing rash or received a diagnosis of confirmed or probable monkeypox **OR**
- Had close or intimate in-person contact with individuals in a social network experiencing monkeypox activity this includes men who have sex with men (MSM) who meet partners through an online website, digital application (“app”), or social event (e.g., a bar or party) **OR**
- Traveled outside the US to a country with confirmed cases of monkeypox or where *Monkeypox virus* is endemic **OR**
- Had contact with a dead or live wild animal or exotic pet that is an African endemic species or used a product derived such animals (e.g., game meat, creams, lotions, powders, etc.).

Exclusion Criteria

A case may be excluded as a suspect, probable, or confirmed case if:

- An alternative diagnosis* can fully explain the illness **OR**
- An individual with symptoms consistent with monkeypox but who does not develop a rash within 5 days of illness onset **OR**
- A case where specimens do not demonstrate the presence of *Orthopoxvirus* or *Monkeypox Virus* or antibodies to orthopoxvirus as describe in the laboratory criteria.

†Clinical suspicion may exist if presentation is consistent with illnesses confused with monkeypox (e.g., secondary syphilis, herpes, and varicella zoster).

* The characteristic rash associated with monkeypox lesions involve the following: deep-seated and well-circumscribed lesions, often with central umbilication; and lesion progression through specific sequential stages-macules, papules, vesicles, pustules, and scabs. This can be confused with other diseases that are more commonly encountered in clinical practice (e.g., secondary syphilis, herpes, chancroid, and varicella zoster). Historically, sporadic reports of patients co-infected with monkeypox virus and other infectious agents (e.g., varicella zoster, syphilis) have been reported, so patients with characteristic rash should be considered for testing, even if other tests are positive.

Categorization may change as the investigation continues (e.g., a patient may go from suspect to probable).

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Monkeypox

Surveillance and Investigation Protocol

C. Case Classification

Suspect Case

- New characteristic rash* **OR**
- Meets one of the epidemiologic criteria and has a high clinical suspicion+ for monkeypox.

Probable Case

- No suspicion of other recent *orthopoxvirus* exposure (e.g., Vaccinia virus in ACAM2000 vaccination) **AND** demonstration of the presence of
 - *Orthopoxvirus* DNA by polymerase chain reaction of a clinical specimen **OR**
 - *Orthopoxvirus* using immunohistochemical or electron microscopy testing methods **OR**
- Demonstration of detectable levels of anti-orthopoxvirus IgM antibody during the period of 4 to 56 days after rash onset.

Confirmed Case

- Demonstration of *Monkeypox virus* DNA by polymerase chain reaction testing or Next-Generation sequencing of a clinical specimen **OR** isolation of *Monkeypox virus* in culture from a clinical specimen.

D. Reporting Timeframe to Public Health

Suspect or confirmed cases of monkeypox cases should be IMMEDIATELY reported to the local health department.

E. Outbreak Recognition

Monkeypox is not endemic in West Virginia. One case of monkeypox in the state is considered an outbreak.

F. Healthcare Provider Responsibilities

- If monkeypox is suspected, report immediately to the local health department (LHD). If the LHD cannot be reached, contact the state epidemiologist on-call at (304) 558-5358, ext. 2. An epidemiologist is available 24/7/365 to assist.
- If a clinician identifies a patient with a rash suspicious for monkeypox, especially those with a recent travel history to a country where monkeypox has been reported, monkeypox should be considered as a possible diagnosis and reported to the LHD.
- A high index of suspicion for monkeypox is warranted when evaluating people with the characteristic rash, particularly for the following:
 1. Traveled outside the US to a country where monkeypox cases have been reported, during the month before their symptoms began,
 2. Reports having contact with a person with similar rash or who received a diagnosis of monkeypox

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Monkeypox

Surveillance and Investigation Protocol

3. Had close or intimate in-person contact with individuals in a social network experiencing monkeypox, this includes men who have sex with men who meet partners through an online website, app, or social event.

Initiate infection prevention and control in the healthcare setting as soon as monkeypox is suspected on a patient. Immediately notify the Infection Preventionist.

1. Isolate patients suspected of having monkeypox in a negative air pressure room as soon as possible. If a negative air pressure room is unavailable, place patients in a private examination room. If neither option is feasible, then precautions should be taken to minimize exposure to surrounding persons. These precautions may include placing a surgical mask over the patient's nose and mouth—if tolerable to the patient—and covering any of the patient's exposed skin lesions with a sheet or gown.
 2. Use appropriate personal protective equipment (PPE) when caring for patient. Required PPE includes gown, respirator, face shield, and gloves.
 3. For additional information about infection control in the hospital:
<https://www.cdc.gov/poxvirus/monkeypox/clinicians/infection-control-hospital.html>.
 4. Patients who do not require hospitalization for medical indications may be isolated at home using protective measures. For additional information about infection control in the home:
<https://www.cdc.gov/poxvirus/monkeypox/clinicians/infection-control-home.html>.
- Specimen collection: Collect multiple specimens for preliminary and confirmatory testing as follows:
 - Obtain specimen samples from more than one lesion, preferably from different locations on the body and/or from lesions with differing appearances.
 - Vigorously swab or brush lesion with two separate sterile dry polyester or Dacron swabs.
 - Break off end of applicator of each swab into a 1.5- or 2-mL screw-capped tube with O-ring, or
 - Place each entire swab in a separate sterile container. Do not add or store in viral or universal transport media.
 - **SPECIMEN COLLECTION and STORAGE (West Virginia Department of Health and Human Resources, Bureau for Public Health - WV Office of Laboratory Services Recommendations):**
 1. Collect multiple specimens for preliminary and confirmatory testing as follows:
 - a. Obtain **two** specimen samples for each site sampled. It is recommended that multiple sites are sampled if there are pustules on different parts of the body or from lesions with differing appearances.
 - b. Use a sterile nylon, polyester, or Dacron swab with a plastic, wood, or thin aluminum shaft. Do not use other types of swabs.
 - c. Vigorously swab or brush lesion with two separate sterile dry polyester or Dacron swabs.
 - d. Break off end of applicator of each swab into a 1.5- or 2-mL screw-capped tube with O-ring, or
 - e. Place each entire swab in a separate individual sterile container. Do **not** add or store in viral or universal transport media.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

2. All specimens (for CDC) should be sent through the WV Office of Laboratory Services (OLS). Coordinate specimen collection and shipment with the health department.
3. Refrigerate (2–8°C) or freeze (-20°C or lower) specimens within an hour after collection.
4. Maximum storage time at the following conditions: refrigerated specimens for up to 7 days and frozen specimens for up to 60 days.
5. Refrigerated specimens should be shipped within 7 days of collection; frozen specimens should be shipped within 60 days of collection. Shipping on dry ice is strongly recommended.
Specimens received that are >8°C will be rejected.
- **SPECIMEN SHIPMENT to OLS BIOTERRORISM LABORATORY**
 1. Contact the WV OLS Bioterrorism Response Lab at 304-205-8917 prior to shipping the sample.
 2. Ideally samples will be shipped immediately upon approval.
 3. Complete the *WV OLS BT Lab Clinical Specimen Submission form*.
https://dhhr.wv.gov/ols/labs/Documents/BT/BTClinicalTestRequestForm_8-07.pdf
 4. Package the sample swabs in an insulated Category A box, with cold packs or dry ice.
 5. Make sure you have enough cold packs or dry ice to last for the whole transit time.
 6. Place the submission form in the box (protected from the ice).
 7. Ship the package as a Suspect Category A.
 8. Ship the sample(s) **FedEx Next-business-day, delivery by 10:30 a.m.** to the WV OLS BT Lab at the address below. The recipient's contact number is 304-205-8917.

WV Office of Lab Services
ATTN: BT Lab
167 11th Avenue
South Charleston, WV 25303
 9. As soon as the package is shipped, email the completed *WV OLS Bioterrorism Lab Clinical Specimen Submission form*, FedEx tracking number, patient initials and patient birth date to Lisa.M.Wallace@wv.gov, Rosemarie.E.Karlen@wv.gov and Nellie.M.Cooper@wv.gov.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

G. Laboratory Responsibilities

- The WV Office of Laboratory Services will provide guidance and assistance on specimen collection, shipping, and handling to health care providers. Appropriately collected samples will be sent to CDC or an appropriate Laboratory Response Network (LRN) laboratory for testing by PCR. LRN laboratories can provide orthopoxvirus testing on lesion specimens that clinicians obtain from suspected patients. Confirmatory monkeypox virus-specific testing at CDC requires a dry lesion swab specimen.

H. Local Health Responsibilities

- Educate the public about monkeypox. Based on limited information available at this time, risk to the public is low. Some people who may have symptoms of monkeypox, such as characteristic rashes or lesions, should contact their healthcare provider for a risk assessment. This includes anyone who:
 1. Traveled outside the US to a country where monkeypox cases have been reported, during the month before their symptoms began,
 2. Reports having contact with a person with similar rash or who received a diagnosis of monkeypox
 3. Had close or intimate in-person contact with individuals in a social network experiencing monkeypox, this includes men who have sex with men who meet partners through an online website, app, or social event.
- Notify DIDE immediately once an individual is suspected of monkeypox.
- Educate health care providers (especially STI providers) about monkeypox, including infection control and prevention measures.
- Assist the health care provider in collecting information and facilitate specimen collection, shipping and handling. Complete the [Monkeypox Report Form](#).
- Disseminate monkeypox information provided by the West Virginia Department of Health and Human Resources, Bureau for Public Health to health care providers.
- Following the diagnosis of monkeypox, initiate contact tracing of individuals who may have been exposed to the patient while the patient was symptomatic. Contacts should be monitored for 21 days after their last date of contact with the patient.

I. State Health Responsibilities

- If monkeypox is suspected, CDC should be consulted through:
 - CDC's 24/7 Emergency Operations Center (EOC): 770-488-7100 or CDC-INFO (1-800-232-4636)
 - Contact CDC Poxvirus and Rabies Branch: poxvirus@cdc.gov
 - **Coordinate medical counter measure requests of the Strategic National Stockpile through the Center for Threat Preparedness.**
- Share CDC's Health Advisory on monkeypox with relevant healthcare provider networks, including STI clinics that may not always receive CDC Health Advisory messages.
- Provide guidance in the investigation and control of monkeypox.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

- Assist LHDs in contact tracing of individuals who may have been exposed to the patient while the patient was symptomatic. Contacts should be monitored for 21 days after their last date of contact with the patient.
- Facilitate specimen collection: For patients who have been evaluated in conjunction with the CDC and determined to meet the CDC's case definition to require further testing, OLS recommends the following:
 - Notify the WV OLS Bioterrorism Response lab that a patient is being tested for Monkeypox.
 - Email the following information to Lisa.M.Wallace@wv.gov, rosemarie.e.karlen@wv.gov, and nellie.m.cooper@wv.gov.
 - Name of facility submitting the sample.
 - Contact person at facility and phone number.
 - Name of the person at the CDC involved in evaluation and their position/role.
 - Contact phone number (if different from EOC main number).
 - CDC's assessment of patient/approval for further Monkeypox testing.
 - Inform the submitting facility to contact the WV Office of Laboratory Services Bioterrorism Response Lab at 304-205-8917 prior to shipping the sample. OLS will answer shipping questions.

For more information about specimen collection, storage, shipping and handling recommendations from OLS, see section III. F. *Healthcare Provider Responsibilities*.

J. Occupational Health

1. Avoid contact with any materials, e.g., bedding, that has been in contact with a sick person.
2. Isolate infected patients from others who could be at risk for infection.
3. Because of the theoretical risk of airborne transmission of monkeypox virus, airborne precautions should be applied whenever possible.
4. If a patient presenting for care at a hospital or other health care facility is suspected of having monkeypox, infection control personnel should be notified immediately.
5. Practice good hand hygiene after contact with infected humans, i.e., wash hands with soap and water or use an alcohol-based hand sanitizer.
6. Use personal protective equipment (PPE) when caring for patients. PPE requirements include gown, respirator, face shield, and gloves. For more information, see [Monkeypox Prevention](#).
7. Vaccination for select persons at risk for occupational exposure to orthopoxviruses (ACIP, 2021):
 - a. Research laboratory personnel,¹ clinical laboratory personnel performing diagnostic testing for orthopoxviruses,² and for designated response team members at risk for occupational exposure to orthopoxviruses.³
 - b. Healthcare personnel who administer ACAM2000 or care for patients infected with replication competent orthopoxviruses based on shared clinical decision-making.⁴
 - c. Persons who are at continued risk⁵ for occupational exposure to more virulent orthopoxviruses like variola virus or monkeypox virus should receive booster doses of JYNNEOS every 2 years after the primary JYNNEOS series.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

- d. Persons who are at continued risk⁵ for occupational exposure to replication competent orthopoxviruses like vaccinia virus or cowpox virus should receive booster doses of JYNNEOS at least every 10 years after the primary JYNNEOS series.
- e. Persons who are at continued risk⁵ for occupational exposure to orthopoxviruses, and who received an ACAM2000 primary vaccination, should receive a booster dose of JYNNEOS as an alternative to a booster dose of ACAM2000.

¹ Research laboratory personnel are those who directly handle 1) cultures or 2) animals contaminated or infected with replication-competent vaccinia virus, recombinant vaccinia viruses derived from replication-competent vaccinia strains (i.e., those that are capable of causing clinical infection and producing infectious virus in humans), or other orthopoxviruses that infect humans (e.g., monkeypox, cowpox, and variola).

² Clinical laboratory personnel who perform routine chemistry, hematology, and urinalysis testing, including for suspected or confirmed patients with orthopoxvirus infections, are not included in this recommendation as their risk for exposure is low.

³ Public health authorities, at their own discretion, may approve a cohort of healthcare and/or public health personnel to receive primary vaccination against orthopoxviruses for preparedness purposes (e.g., first responders who might participate in a smallpox or monkeypox outbreak).

⁴ For example, those caring for patients enrolled in clinical trials for replication-competent orthopoxvirus vaccines and those caring for persons with suspected or confirmed orthopoxvirus infections (e.g., clinicians and environmental services personnel).

⁵ Continued risk refers to persistent risk due to occupational work performed. Designated public health and healthcare worker response teams approved by public health authorities are not at "continued risk" because they are vaccinated for the purposes of preparedness.

IV. DISEASE SURVEILLANCE

A. Public Health Significance

Monkeypox is a zoonotic disease that typically presents with fever, rash, and swollen lymph nodes. It was first discovered in 1958 following outbreaks of pox-like disease in monkeys kept for research, hence the name "monkeypox." Monkeypox was first documented in humans in 1970 in the Democratic Republic of Congo. Since then, monkeypox has been reported in people in several central and western African countries. Monkeypox can cause severe disease. The case fatality ratio was estimated at 3-6%. Monkeypox is a rare disease in the U.S. On May 17, 2022, a case of monkeypox was reported in a U.S. resident returning from Canada. During this time, multiple clusters of monkeypox have been reported in several countries in Europe and North America involving people who self-identify as gay, bisexual, or men who have sex with men (MSM).

B. Disease Surveillance Objectives

- 1. To identify and characterize the epidemiologic features of monkeypox.
- 2. To detect and monitor trends of monkeypox.

C. Surveillance Indicators

- 1. Proportion of cases with complete clinical, laboratory, and exposure information.

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rev. 06.06.2022

Monkeypox

Surveillance and Investigation Protocol

2. Proportion of cases that were reported to public health in a timely manner.

V. REFERENCES

1. Centers for Disease Control and Prevention. Monkeypox at <https://www.cdc.gov/poxvirus/monkeypox/index.html>
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4. World Health Organization at <https://www.who.int/news-room/fact-sheets/detail/monkeypox>
5. U.S. Federal Drug Administration. JYNNEOS at <https://www.fda.gov/media/131078/download>
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